



Attorney Docket No. 2676-000005

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Appeal No. _____

Group Art Unit: 2633)
Examiner: Agustin Bello)
Applicants: Ross Saunders) **Appeal Brief**
Serial No.: 09/940,139)
Filed: August 27, 2001)
Title: FAULT ISOLATION TECHNIQUES)
FOR ALL OPTICAL NETWORKS)

)

BRIEF ON BEHALF OF APPELLANTS

This is an appeal from the action of the Examiner dated January 25, 2005, finally rejecting Claims 1-11 of the present application. Copies of the appealed claims are attached as an appendix.

I. Real Party In Interest

The real party in interest in the present application is PTS Corporation who is the current assignee of the application.

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II. Related Appeals and Interferences

There are no known related appeals or interferences which will directly affect, be directly affected by, or otherwise have a bearing on the Board's decision in the pending appeal.

III. Status Of The Claims

Claims 1-11 are pending in the present application. Each of these pending claims stand rejected and are appealed.

IV. Status Of Amendments

Applicant's response after final rejection did not propose any amendments to the pending claims. Therefore, Claims 1-11 stand as amended by the response filed on October 4, 2004 and as presented in the attached appendix.

V. Summary Of The Invention

Fault isolation is an essential network management function for optical transport networks. Optical transport networks typically employ numerous regenerators to remove noise and distortion from the signals propagating through optical networks. Regenerators may also perform signal error checking that enables sectionalization of errors in optical networks. In this scenario, faults may be isolated by checking error detection data embedded in the optical signals at each of the regenerators residing in an optical network. However, optical transport networks are beginning to employ partial regenerators that do not perform signal error checking. Therefore, it is desirable to

provide a method for isolating faults in an optical network which employs partial regenerators.

Applicant's invention is directed to a method for isolating faults in an optical path of an optical network having a plurality of partial regenerators. Briefly, the method includes: transmitting an optical signal through the optical network; and determining an error rate for the optical signal at an egress point of the optical network. A dither control signal is then sequentially introduced into the optical signal at various points along the optical path. By monitoring the error rate of the optical signal at the egress points of the optical network, the occurrence and/or location of a fault may be isolated within the optical network.

VI. Issues

- I. Are Claims 1-7 unpatentable over U.S. Patent No. 5,963,312 (Roberts) under 35 U.S.C. §103(a)?
- II. Are Claims 8-11 unpatentable over Roberts under 35 U.S.C. §103(a)?

VII. Grouping of Claims

In the present application, a first group of Claims 1-7 are directed to a method for isolating faults in an optical path of an optical network having partial regenerators; the claims of this group do not stand or fall together and each claim must be considered separately for patentability. A second group of Claims 8-11 are also directed to a method for isolating faults in an optical path of an optical network; the claims of this group do not stand or fall together and each claim must be considered separately for patentability.

VIII. Arguments

I. Claims 1, 2, 5 and 7-11 stand rejected under 35 USC §103(a) as being unpatentable over U.S. Patent No. 5,963,312 (Roberts). Applicant traverses this rejection.

Roberts is similarly directed to a system for locating sources of degradation along an optical path. However, Roberts fails to teach or suggest selectively dithering an optical data signal at various points along an optical path through the use of partial regenerators as a technique for isolating faults in the optical path.

First, Roberts fails to teach the use of partial regenerators in an optical network as conceded by the Examiner. The Examiner then asserts that one skilled in the art would have incorporated a partial regenerator into the system disclosed by Roberts. By "system", Applicant is unclear as to whether the Examiner means an optical transmission system having a transmitter 1, a series of optical elements 2, and a receiver 3; or a system for locating sources of degradation. Assuming arguendo a partial regenerator is incorporated in the Robert's "system", there are no teachings in Roberts as to how a partial regenerator might be used to isolate faults. On the contrary, partial regenerators are typically employed to correct faults in an optical signal, thereby teaching away from this intended use of partial regenerators as recited in Applicant's claimed invention.

Rather than introducing a control signal at different points along the path, Roberts teaches inserting a test pattern signal at an ingress of an optical path and then monitoring at different points along the path as shown in Figure 1. To the extent that Roberts contemplates introducing a test signal at different points along the path, it discloses the insertion of an additional transmitter 81 as shown in Figure 8. Therefore, Roberts fails to

teach or suggest using partial regenerators to introduce a control signal (i.e., dithering the transmission signal) as recited in Applicant's claimed invention. In either case, Roberts teaches a technique which requires additional equipment (either receivers 4 or transmitters 81, respectively) at each monitoring location as compared to Applicant's claimed invention. By using existing network elements, Applicant provides a cheaper approach.

Citing col. 7, lines 35-36, the Examiner further asserts that Roberts teaches introducing a dither control signal into the optical signal at two or more optical elements. Contrary to the Examiner's assertion, this portion of Roberts merely teaches remedial action which may be taken once a fault is located. One proposed remedial action is adjusting the gain of an optical amplifier. Applicant contends adjusting the gain of an optical signal once a fault has been identified is different than adjusting the gain for purposes of isolating a fault as is done in Applicant's claimed invention. In addition, Roberts is unclear as to how the gain is being adjusted. Dithering the optical signal as recited in Claim 1 is an unlikely remedial action and therefore not contemplated by this portion of Roberts.

In sum, Roberts fails to teach or suggest selectively dithering an optical data signal at various points along an optical path through the use of partial regenerators as a technique for isolating faults in the optical path. For at least these reasons, it is respectfully submitted that Claim defines patentable subject matter over Roberts.

Dependant Claims 2-7 further recite more specific aspects of Applicant's claimed invention. For instance, Claim 6 recites "sequentially introducing the dither control signal

at each of said plurality of partial regenerators". This particular implementation of Applicant's invention is also not found in the relied upon references. Therefore, it is respectfully submitted that these dependent claims also recite subject matter patentably distinct from the subject matter recited in Claim 1.

II. Claims 8-11 stand rejected under 35 USC §103(a) as being unpatentable over Roberts. Applicant traverses this rejection.

For at least the reasons explained above, it is submitted that Claims 8-11 recite patentable subject matter over Roberts. Furthermore, Claims 8, 9, 10 and 11 further define Applicant's technique for isolating faults in an optical path. For example, an error associated with a dithered optical signal is evaluated at an egress point before the optical signal is dithered at a different location along the optical path. Since these further aspects of the present invention are also absent from the relied upon references, these claims should be considered separately for patentability.

IX. CONCLUSION

For the foregoing reasons, the appealed claims are patentably distinguishable over the art relied upon by the Examiner. Accordingly, Applicant's representative respectfully requests that this Board reverse the final rejection of Claims 1-11.

Respectfully submitted,



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APPENDIX

X. Claims On Appeal

1. (previously presented) A method for isolating faults in an optical path of an optical network having a plurality of partial regenerators, comprising:

transmitting an optical signal through the optical network, the optical signal having error detection data embedded therein;

determining an error rate for the optical signal at an egress point of the optical network, where the error rate is based on the error detection data embedded in the optical signal;

dithering the optical signal by varying an amplitude of the optical signal at two or more of said plurality of partial regenerators; and

monitoring the error rate for the optical signal at the egress point of the optical network; thereby isolating where a fault occurs in the optical network.

2. (original) The method of Claim 1 wherein the step of transmitting an optical signal further comprises embedding error detection data in B1 byte of a data frame in accordance with SONET protocol.

3. (original) The method of Claim 1 wherein the step of determining an error rate further comprises calculating Q for the optical signal at the egress point of the optical network.

4. (original) The method of Claim 1 wherein the step of determining an error rate further comprises deriving the error rate from the number of corrected errors in a forward error correction scheme.

5. (original) The method of Claim 1 wherein the step of introducing a dither control signal further comprises introducing the dither control signal at a transmitter in the optical path, thereby assessing if a fault exists downstream from the transmitter.

6. (original) The method of Claim 1 wherein the step of introducing a dither control signal further comprises sequentially introducing the dither control signal at each of said plurality of partial regenerators, thereby assessing if a fault exists downstream from a given partial regenerator.

7. (original) The method of Claim 1 wherein the steps of introducing a dither control signal and monitoring the error rate for the optical signal are performed only when the error rate for the optical signal exceeds a predetermined threshold error rate indicative of a fault in the optical network.

8. (previously presented) A method for isolating faults in an optical path of an optical network having a plurality of partial regenerators, comprising:

transmitting an optical signal through the optical network;

determining a baseline error rate for the optical signal at an egress point of the optical network;

dithering the optical signal by varying an amplitude of the optical signal at a first partial regenerator;

determining a first error rate for the optical signal at the egress point of the optical network; and

evaluating the first error rate in relation to the baseline error rate, thereby assessing if a fault exists downstream from the first partial regenerator.

9. (previously presented) The method of Claim 8 further comprising the steps of:

dithering the optical signal at a transmitter residing in the optical path;

determining a first error rate for the optical signal at the egress point of the optical network; and

evaluating the first error rate in relation to the baseline error rate, thereby assessing if a fault exists downstream from the transmitter.

10. (previously presented) The method of Claim 8 further comprises the steps of:

- (a) dithering the optical signal by varying the amplitude of the optical signal at a second partial regenerator located downstream from the first partial regenerator;
- (b) determining a second error rate for the optical signal at the egress point of the optical network; and
- (c) evaluating the second error rate in relation to the baseline error rate, thereby assessing if a fault exists downstream from the second partial regenerator.

11. (original) The method of Claim 10 further comprises repeating steps (a) thru (c) for each of said plurality of partial regenerators in the optical network.